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REPORT TO THE CONGRESS

Measuring Regional
Variation in
Service Use

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Executive summary

Executive summary

In this paper, we present data on the difference between regional variation in Medicare spending and regional variation in the use of Medicare-covered services. Regional variation in Medicare spending per beneficiary reflects many factors, including differences in beneficiaries' health status, Medicare payment rates, service volume (number of services), and service intensity (e.g., MRI versus simple X-ray). In contrast, regional variation in the use of Medicare services reflects only differences in the volume and intensity of services that beneficiaries with comparable health status receive. Although service use varies less than spending, the amount of services provided to beneficiaries with similar resource needs still varies substantially.

To convert raw (unadjusted) Medicare spending to an index of service use, we first adjust program spending for differences in Medicare payment rates (due to regional wages, special payments to teaching hospitals, rural add-on payments, etc.). Removing these differences in payment rates is a necessary step to isolate differences in service use. It does not mean we accept payment rates as appropriate; in past reports for example, we have recommended changing the way Medicare computes the hospital wage index and special payments to teaching hospitals (MedPAC 2009, 2007b). We next adjust for differences in beneficiaries' health status and several other nonpayment factors. We adjust for health status so that we are comparing service use among groups of people who have comparable needs for clinical resources. Throughout this paper, the term service use refers to Medicare spending adjusted for Medicare payment rates and the health status of the patient.

After we adjust Medicare spending to create an index of service use, we can use those data to examine regional differences both in the level and growth of service use. We aggregated urban counties into metropolitan statistical areas (MSAs) and nonurban counties in the same state into rest-of-state nonmetropolitan areas. We calculated per capita spending and service use in each MSA and nonmetropolitan area and found that service use has less regional variation than raw spending, but substantial variation remains. We found an approximately 30 percent difference in service use between the area at the 10th percentile of the distribution and the area at the 90th percentile of the distribution. Looking at the extremes, there is nearly a twofold difference between the area with the greatest service use (Miami–Dade County) and the area with the least service use (nonmetropolitan Hawaii). (Data on service use at the MSA and nonmetropolitan area level are in the Appendix to this report at http://medpac.gov/chapters/Dec09_RegionalVariation_Appendix.pdf.)

The second issue we discuss is growth in service use. Although growth in service use also varies by region, it is not positively correlated with the level of service use. In other words, some low-use regions have rapid growth rates and some high-use regions have low growth rates.

In summary, we find:

- Regional variation in service use is not equivalent to regional variation in Medicare spending. The two should not be confused.

- Medicare spending varies in part because of the factors Medicare uses to account for differing wages and special circumstances, such as the wage index and health provider shortage area payments. We must adjust for those factors to arrive at service use, but the appropriate levels of those payment factors are separate issues that deserve consideration in their own right.
- Although regional variation in service use is smaller than regional variation in Medicare spending, it is substantial: Service use in higher use areas (90th percentile) is about 30 percent greater than in lower use areas (10th percentile). The range between the extremes shows an almost twofold difference, but, at the high end, fraud and abuse may drive some of the highest reported service use.
- Regions that have high levels of service use are not always the regions with high growth rates.
- Service use varies at all geographic levels, including within states and among providers within MSAs.

Measuring regional variation in service use

Adjusting for payment rates and health in analysis of regional variation in Medicare spending

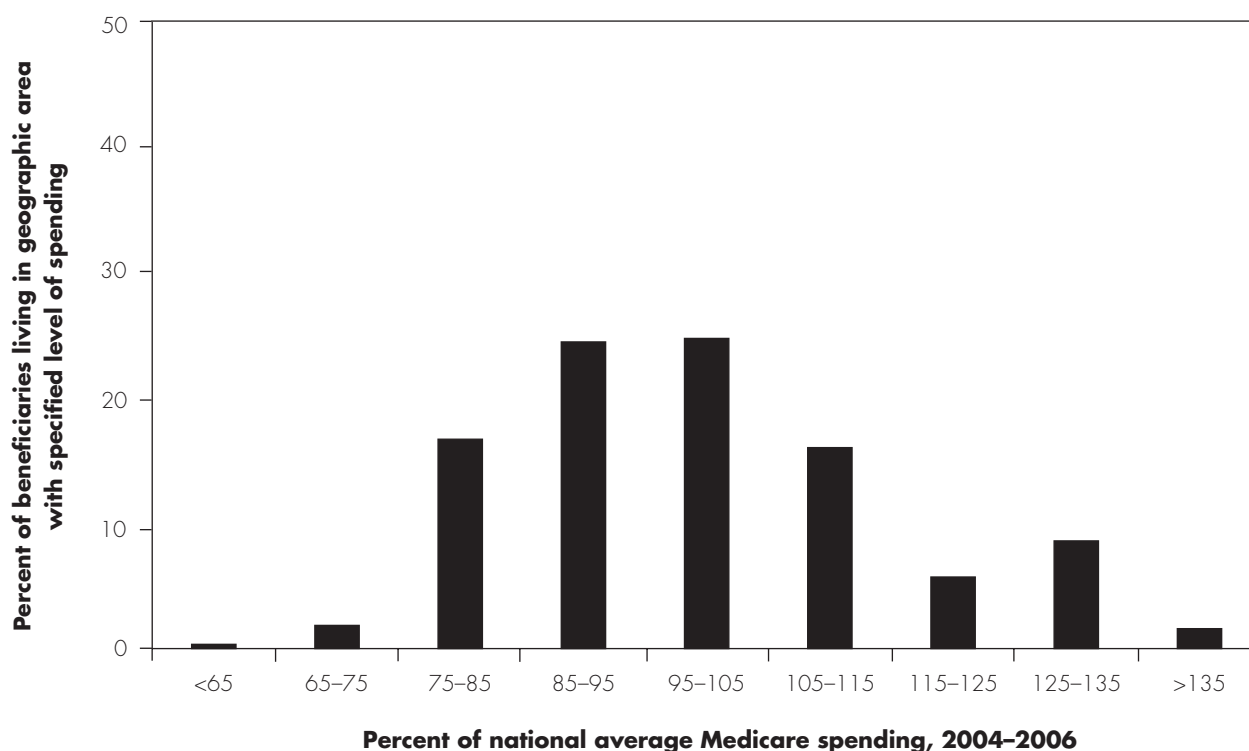
We first examine raw (unadjusted) Medicare spending as reported in CMS data. We then translate these data into a measure of service use and examine them.

Medicare spending

In our evaluation of variation in Medicare spending, we start with county-level program spending for beneficiaries in the traditional Medicare fee-for-service (FFS) program as reported by the CMS Office of the Actuary.¹ For the purpose of presentation, we aggregate the county-level data to metropolitan statistical areas (MSAs) and rest-of-state nonmetropolitan areas; we then weight each geographic area by its Medicare population (Figure 1). This level of aggregation is intermediate between counties, which can have very small populations and hence unstable spending data, and states, which can combine very different health care market areas and

Figure 1

Medicare spending per beneficiary varies widely by geographic area



Note: Geographic areas are metropolitan statistical areas and rest-of-state nonmetropolitan areas. Results exclude Medicare spending for Maryland because of the unique system under which Maryland hospitals are reimbursed by the Medicare program.

Source: MedPAC analysis of county-level, fee-for-service Medicare spending data from CMS.

thus obscure important differences. We average three years of data (2004, 2005, and 2006) to minimize any remaining instability due to areas with very few beneficiaries.

Raw (unadjusted) Medicare spending per beneficiary varies widely across geographic areas. Approximately 2 percent of the FFS population lives in an area with per capita spending 25 percent below the national average (Figure 1, first two bars). About a quarter of the FFS population lives in areas that have Medicare spending within 5 percent of the national average (Figure 1, bar labeled 95–105), and about 10 percent lives in areas with spending more than 25 percent above the national average (Figure 1, last two bars). Another way to view the variation is that raw per capita spending is 55 percent higher for beneficiaries in the area at the 90th percentile than for beneficiaries in the area at the 10th percentile (not shown in Figure 1).²

Translating Medicare spending into a measure of service use

Medicare spending can vary geographically because of differences in Medicare payment rates and differences in beneficiaries' health. However, we are interested in geographic variation in service use; that is, the volume (number) and intensity (e.g., MRI versus X-ray) of services. Differences in service use can result from differences in physician practice patterns, entrepreneurial tendencies, and care decisions; from beneficiaries' care seeking tendencies (including differences in supplemental insurance, family support, ease of access); and from other factors. To develop a measure of service use, we start with Medicare program spending for residents of each county in the United States described in the previous section. For a better understanding of how widely service use varies, we need to adjust that spending for differences in:

- regional prices (measured by hospital wage indexes and geographic practice cost indexes).
- additional payments to hospitals above the standard rates in the inpatient prospective payment system including graduate medical education, indirect medical education, and disproportionate share payments.
- additional payments to physicians above the standard rates in the physician fee schedule in provider scarcity areas and health provider shortage areas.
- additional payments to rural hospitals above standard rates in the inpatient prospective payment system, including special payments for sole community hospitals, small rural Medicare-dependent hospitals, and critical access hospitals.
- beneficiaries' health status, as measured by the MSA's average risk score from the CMS–hierarchical condition category (HCC) risk adjustment model.³
- the rate of beneficiaries' enrollment in Part A and Part B of the Medicare program—in some areas, the percentage of beneficiaries with only Part A or Part B coverage differs significantly from the national average.

Bear in mind that removing the effects of factors Medicare uses to account for differing wages and special circumstances, such as the wage index and health provider shortage area payments, does not mean they are unimportant. We must adjust for those factors to arrive at service use, but the appropriate levels of those payment factors are important issues that deserve consideration

Differences between Medicare spending and service use

Medicare spending is the amount the Medicare program spends per beneficiary in the traditional fee-for-service program. This amount differs by geographic region.

Service use is Medicare spending adjusted to remove the effects of differing payment rates and differing health status among geographic regions. The intent is to produce a comparable measure of service use for similar beneficiaries with similar resource needs.

In summary, the adjustments are designed to remove:

- differences in Medicare payment rates that are included in payment systems to reflect differences in underlying input costs (e.g., wages).
- additional payments included in the payment systems to reflect the unique status of providers (such as teaching hospitals and hospitals in isolated rural areas). If all geographic regions had the same mix of these providers this adjustment would not be needed. However, that is not the case, some regions, for example, have many teaching hospitals some have very few; some regions have many critical access hospitals, some none.
- differences in the average health status of beneficiaries in different geographic regions.
- differences in the rate of enrollment in Part A and Part B of the Medicare program. Enrollees with only Part A or Part B experience different rates of spending. In essence, we have adjusted to approximate spending for an enrollee with both Parts A and B.

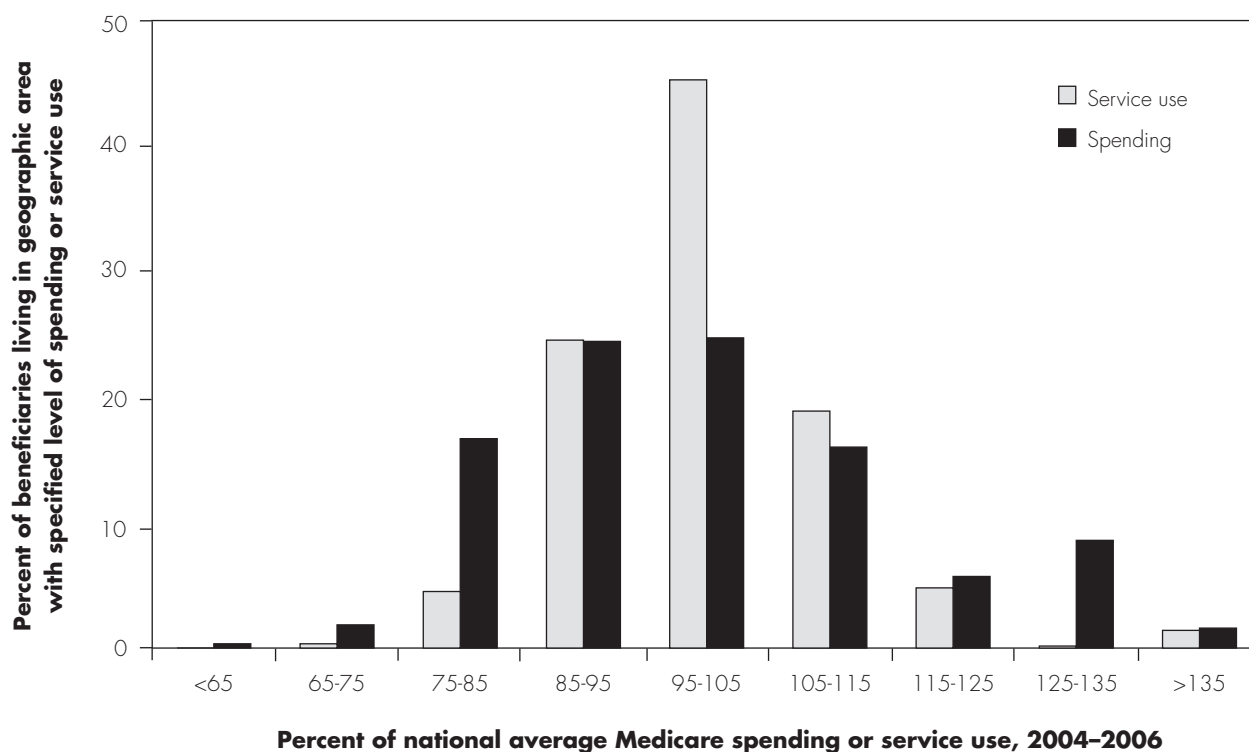
in their own right. These adjustments are similar to the methods described at greater length in Chapter 1 of our June 2003 report and are summarized in the text box (MedPAC 2003).

Resulting variation in service use

Adjusting Medicare spending for these factors produces a measure of service use that has less regional variation than raw spending (Figure 2). Less than 1 percent of the FFS population lives in areas that have service use more than 25 percent below the national average (Figure 2, first light bar). Approximately 45 percent of the FFS population lives in areas that have service use within 5 percent of the national average. In contrast, only 25 percent of FFS beneficiaries live in areas where raw spending is within 5 percent of the national average (Figure 2, bars labeled 95–105). Fewer than 2 percent live in areas with service use more than 25 percent above the national average (Figure 2, last two light bars). Another way to consider the variation is that service use is about 30 percent higher for beneficiaries in the area at the 90th percentile than for beneficiaries in the area at the 10th percentile (the corresponding figure for raw spending is 55 percent) (not shown in Figure 2). (We discuss the extremes of the variation on p. 7. Data on service use at the

Figure 2

Service use varies less than raw spending per beneficiary, but substantial variation remains



Note: Geographic areas are metropolitan statistical areas and rest-of-state nonmetropolitan areas. Results exclude Medicare spending for Maryland because of the unique system under which Maryland hospitals are reimbursed by the Medicare program.

Source: MedPAC analysis of Medicare fee-for-service spending data from CMS.

MSA and nonmetropolitan area level are in the Appendix to this report at http://medpac.gov/chapters/Dec09_RegionalVariation_Appendix.pdf.)

The average service use for MSAs is 101 percent of the national average, and for nonmetropolitan areas service use is 97 percent of the national average. However, there is wide variation underlying both averages. MSA service use values range from 75 percent to 139 percent of the national average. Nonmetropolitan service use values range from 70 percent to 123 percent of the national average.

Variation in service use exists at all levels of geography. Thus far, we have examined variation across the nation; however, there is also variation within states and within MSAs. For example, among areas (MSAs and the statewide nonmetropolitan area) in Oklahoma, per beneficiary service use is 24 percent higher in the highest use area than in the lowest use area. We also know from previous work that there is variation among providers within MSAs. For example, within the Phoenix MSA, at the individual physician level, we found that cardiologists' costs for similar episodes of care varied from 42 percent below the mean for cardiologists at the 10th percentile

Table 1**Level and growth of service use are not positively correlated across MSAs**

MSA	Per capita service use as percent of national average, 2004–2006	Annual growth rate as percent of national average, 2000–2006*	Expected per capita increase as percent of national average**
A	75%	109%	81%
B	86	97	84
C	87	73	64
D	89	141	125
E	100	112	112
F	100	70	70
G	106	128	136
H	112	169	189
I	114	56	64
J	139	135	187
National average	100	100	100

Note: MSA (metropolitan statistical area). Service use as a percent of national average is an MSA's service use averaged over 2004 to 2006 as a percentage of the national average service use over the same period.

* Annual growth rate as percent of national average is the annual growth rate for 2000 to 2006 for each MSA divided by the national annual growth rate for the same period.

** Expected per capita increase as percent of national average is the product of the values in the second and third columns. It indicates how much service use per capita would be expected to increase in an MSA relative to the expected national average increase.

Source: MedPAC analysis of county-level, fee-for-service Medicare spending data from CMS.

to 62 percent above the mean for cardiologists at the 90th percentile (MedPAC 2007a). These examples suggest that substantial variation exists within states and within MSAs.

Correlation between levels of service use and growth is slightly negative

It is important to bear in mind that an area can have a high level of service use without having a high rate of growth and vice versa (Table 1). Table 1 lists 10 large MSAs in order of service use. MSA C has a low level of service use (87 percent of average) and a low rate of growth (73 percent of average), and MSA D has a low level of service use (89 percent of average) and a high rate of growth (141 percent of average). MSA H has a high level of service use and a high rate of growth, whereas MSA I has a high level of service use and a low rate of growth. Over all the MSAs and nonmetropolitan areas in our data, the correlation between rate of growth in adjusted spending from 2000 to 2006 and the level of service use in an MSA is slightly negative.

The last column of Table 1 shows the expected per capita increase as a percent of the national average. This value is the product of the relative level of service use in the second column and the relative rate of growth in service use in the third column. It reflects how much per capita service use would be expected to increase in each MSA relative to the expected increase for the

nation, assuming growth continued at the 2000–2006 rate. The last column suggests that the level and growth in service use are both important. For example, due to a high growth in service use, MSA A has a higher relative expected increase in per capita service use (81 percent) than MSA I (64 percent), although MSA I has a much higher level of service use.

Unique factors may drive extreme levels of service use

Many factors drive service use, such as differences in physician practice patterns and care decisions and differences in beneficiaries' predilection for seeking care (including differences in supplemental insurance). But service use among regions could differ for more idiosyncratic reasons as well. Looking at the extremes, the MSA with the greatest service use (Miami) has twice the level of service use as the region with the lowest service use (nonmetropolitan Hawaii).

The low service use in Hawaii may reflect unique characteristics and preferences that result in beneficiaries having similar levels of physician outpatient visits but lower levels of institutional (hospital, skilled nursing facility, hospice) care than in other parts of the United States. When looking at regions with very high levels of service use, factors such as physician practice patterns and beneficiaries' predilection for care may drive service use above average but different factors may account for the most extreme reported service use in areas like the Miami–Dade County, Florida, MSA. For example, after our adjustments, reported service use in Miami–Dade County was almost 40 percent higher than the national average and more than 10 percent higher than in any other large MSA.

To look more closely at what may account for this finding, we examined Medicare claims from the Beneficiary Annual Summary File that Acumen LLC compiled from Medicare claims from CMS. We found that per capita spending on durable medical equipment and home health care in Miami–Dade County were both more than seven times the national average and dramatically above spending in neighboring counties (Table 2, p. 8). These types of patterns in the data raise concerns about fraud and abuse by some providers (OIG 2009a, OIG 2009b, OIG 2007a, OIG 2007b).

Data limitations

We have aggregated county-level data from the CMS Office of the Actuary in our presentations of regional levels of service use and growth rates. Those original data are at the county level and, therefore, adjustments cannot be made at any lower level. The county data also report only Part A and Part B aggregate spending rather than spending by individual sectors (e.g., hospital, skilled nursing facility), which limits our ability to adjust for site-of-service differences. However, to confirm the robustness of our results, we also examined geographic variation using a sample of Medicare claims data. We have found generally consistent results, but there are individual counties whose measured service use relative to the national average depends on the data set used. Because of data limitations and annual variations in spending in smaller counties, we caution that data for an individual county or small MSA may vary when presenting data from a single year or from a sample of beneficiaries in that county.

We have used the average CMS–HCC score by county to adjust for health status. As is true for any risk adjustment model, the CMS–HCC does not explain all the variation in future payments

Table 2**DME and home health spending per beneficiary in south Florida, 2006**

Neighboring Florida counties	Count of beneficiaries	DME spending per beneficiary	Home health spending per beneficiary
Collier	60,112	\$220	\$330
Monroe	11,025	260	350
Broward	141,283	430	1,150
Miami-Dade	183,754	2,200	2,830
National	37,285,752	250	370

Note: DME (durable medical equipment). Spending data are annualized for beneficiaries with either Part A or Part B coverage for at least one month during 2006. The results are not adjusted for differences in beneficiaries' health status.

Source: CMS Beneficiary Annual Summary File compiled by Acumen, LLC (100 percent sample).

and is limited in that respect. Also, some maintain the CMS–HCC model overadjusts in areas of high service use because there are more opportunities to make diagnoses in areas of higher use and the CMS–HCC model uses diagnoses among other factors in its score. We cannot quantify that effect.

Summary

Our analysis of regional variation in per beneficiary Medicare spending and service use yields five key findings:

- Regional variation in service use is not equivalent to regional variation in Medicare spending. The two should not be confused.
- Medicare spending varies in part because of the factors Medicare uses to account for differing wages and special circumstances, such as the wage index and payments in health provider shortage areas. We must adjust for those factors to arrive at service use, but the appropriate levels of those payment factors are separate issues that deserve consideration in their own right.
- Although regional variation in service use is smaller than regional variation in Medicare spending, it is substantial: Service use in higher use areas (90th percentile) is about 30 percent greater than in lower use areas (10th percentile). The range between the extremes shows an almost twofold difference, but, at the high end, fraud and abuse may drive some of the highest reported service use.
- Regions that have high levels of service use are not always the regions with high growth rates.
- Service use varies at all geographic levels, including within states and among providers within MSAs.

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Endnotes

1. The actuary's raw data are available on the CMS website at http://www.cms.hhs.gov/MedicareAdvtgSpecRateStats/05_FFS_Data.asp#TopOfP. The data are for Medicare program spending on aged and disabled beneficiaries in the FFS program; they do not include beneficiary cost sharing, Part D spending, or beneficiaries in Medicare Advantage or other non-FFS programs (e.g., cost plans). We also excluded beneficiaries who are eligible because of end-stage renal disease. We adjusted the actuary's data to take out the effect of differences in the share of beneficiaries enrolled in Medicare Part A and Part B in different parts of the country. We also adjusted the data in counties where more than 5 percent of the beneficiary population was enrolled in Medicare cost plans to account for cost plan enrollees' FFS claims under the assumption that these claims were included in the Office of the Actuary's cost estimates.
2. At the extremes, expenditures in the highest spending area are more than two and a half times those in the lowest spending area.
3. The CMS–HCC risk adjustment model predicts a beneficiary's spending in the next year based on diagnostic and demographic information in the current year. It takes into account a beneficiary's age, sex, diagnoses, institutional status, and enrollment status (Medicaid, disability, end-stage renal disease).

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The Medicare Payment Advisory Commission is a Congressional agency that provides independent, non-partisan policy and technical advice to the Congress on issues affecting the Medicare program.

The Commission's goal is to achieve a Medicare program that assures beneficiary access to high-quality care, pays health care providers and health plans in a manner that is fair and rewards efficiency and quality, and spends tax dollars responsibly.

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